Attachment C

APPARATUS AND METHOD FOR POLARIZING POLARIZABLE NUCLEAR SPECIES

The instant application claims the benefit of U.S. Provisional Application Serial Number 60/217,569 filed on July 12, 2000.

Field of the Invention

The present invention is in the field of hyperpolarizing polarizable nuclear species, such as xenon.

Background of the Invention

Nuclear magnetic resonance (NMR) is a phenomenon, which can be induced through the application of energy against an atomic nucleus being held in a magnetic field. The nucleus, if it has a magnetic moment, can be aligned within an externally applied magnetic field. This alignment can then be transiently disturbed by application of a short burst of radio frequency energy to the system. The resulting disturbance of the nucleus manifests as a measurable resonance or wobble of the nucleus relative to the external field.

For any nucleus to interact with an external field, however, the nucleus must have a magnetic moment, i.e., non-zero spin. Experimental nuclear magnetic resonance techniques are, therefore, limited to study of those target samples, which include a significant proportion of nuclei exhibiting non-zero spin. Certain noble gases, including xenon, are in principle suited to study via NMR. However, the low relative natural abundance of these isotopes, their small magnetic moments, and other physical factors have made NMR study of these nuclei difficult if not impossible to accomplish.

Existing technology for polarizing xenon, developed primarily at Princeton, is based on earlier work on nuclear polarized 3He gas targets for nuclear physics. The key component

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